when the Au film is directly formed on a substrate in the absence of a suitable underlayer therebetween, it often grows in islands. In order to prevent this, a particular underlayer is provided between the Au film and the substrate in (f). Above the underlayer, the smoothness of the Au film formed is enhanced as much as possible so as to ensure a sharp interface between the Au film and the overlying NiFe film.

However, the underlayer in (f) is not practicable. Briefly, in producing (f), an Au film is formed on the subbing $Bi_2O_3$ film having a thickness of 20 nanometers. This is to utilize the fact that the Au film formed on the subbing $Bi_2O_3$ film exhibits good reflectivity after it is annealed at 350°C (Ref.; C.R. Tellier and A.J. Tosser, Size Ellects in Thin Films, Chapter I, Elsevier, 1982; L.I. Maissel et al., Handbook of Thin Film Technology, McGraw-Hill Publishing Company, 1983).

In addition, another underlayer of $Si_3N_4$ film having a thickness of 200 nanometers is provided below the $Bi_2O_3$ film. In other words, the two-layered underlayer having a total thickness of 220 nanometers is formed below the Au film, which is then annealed at a high temperature of 350°C. The thick underlayer having a thickness of 220 nanometers is extremely disadvantageous for narrow gaps that shall be much more narrowed for the coming, high-density recording systems, and will be almost impracticable. In addition, the high-temperature thermal treatment at 350°C will cause interfacial

diffusion at the interface of magnetic layer/nonmagnetic spacer layer, thereby disturbing the spin-dependent scattering of electrons which is intrinsic and indispensable to GMR films. As a result, the MR ratio in the film will be greatly lowered. The thermal treatment temperature for the film (f) will cause interfacial scattering even in other SV films that incorporate a laminate film of Co(CoFe)/Cu/Cu(CoFe) having good thermal stability.

(3) Magnetostriction control in CoFe:

Where a CoFe layer is used as a free layer, it is understood that an fcc(111)-oriented underlayer may be applied thereto so as to induce fcc(111) orientation of the CoFe layer, whereby the soft magnetic characteristics of the CoFe layer is improved. As the fcc(111)-oriented underlayer, used is a Cu layer or an Au layer. However, we, the inventors have found that, in the conventional technique, the magnetostriction which is another important factor of soft magnetic characteristics is not controlled at all, and that the thermal stability of the CoFe layer much depends on the underlayer. For example, the SV films based on the published patent specification noted above include the following:

(g) 5 nanometer Ta/2 nm Cu/2 nm CoFe/3 nm Cu/2 nm CoFe/7 nm IrMn/5 nanometer Ta,

(h) 5 nanometer Ta/2 nm Au/3 nm CoFe/3 nm Cu/2 nm CoFe/7 nm IrMn/5 nanometer Ta.

In the film (g), the Cu layer is oriented in fcc(111), and the CoFe layer above the fcc(111)-oriented Cu layer is also oriented in fcc(111) to exhibit soft magnetic characteristics. However, the film (g) is problematic in that (i) its thermal stability is poor (the MR ratio in the as-deposited film of 8.1 % is decreased to 6.5 % after thermal treatment at 250°C for 4 hours, and the MR ratio reduction in the heat-treated film is 20 % in terms of the relative ratio), and (ii) the magnetostriction $\lambda$ is $-14 \times 10^{-7}$, and its peak value is large. Thus, the film (g) is not always practicable. Regarding the magnetostriction $\lambda$, there is no definite standard in the art. As one standard, the preferred range of the magnetostriction $\lambda$ will fall between $-10 \times 10^{-7}$ and $+10 \times 10^{-7}$ or so.

In addition, even when Au is used as the fcc material in place of Cu (as in the film (h)), the film is still problematic in that (i) its thermal stability is poor (the MR ratio in the as-deposited film of 8.4 % is decreased to 6.5 % after thermal treatment at 250°C for 4 hours, and the MR ratio reduction in the heat-treated film is 23 % in terms of the relative ratio), and (ii) the magnetostriction $\lambda$ is $+33 \times 10^{-7}$, and its peak value is large. Thus, like that with a Cu layer, the film is still not always practicable.

XRD patterns of the spin valve films (g) and (h) are obtained through $\theta$ - $2\theta$ scanning, and studied. In those patterns, the three layers of CoFe/Cu/CoFe had nearly the same